

VEGETATION MANAGEMENT PLAN FOR CRAGGY GARDENS

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Blue Ridge Parkway
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SUMMARY

The purpose of this document is to layout a long-term plan for managing vegetation issues at Craggy Gardens. Four subject areas are identified: 1) Grassy Balds, 2) Rare plant species, 3) Exotic plant species, and 4) Unofficial trails. Concerns and solutions will be developed for each subject area. **Grassy Bald:** Locations where existing remnants of the Grassy Bald Community occur will be restored. Using historic information, on-site data, and aerial photography dating to 1979 a targeted restoration boundary is defined. Using this boundary, approximately 12 acres of Grassy Bald will be restored. **Rare Plant Species:** Various measures have been implemented around Craggy Pinnacle to protect the rare and fragile vegetation of the site. Long-term monitoring will be initiated to evaluate the relative success of these measures as well as to assess the overall health of several plant populations. Augmentation of rare plant populations with new plants which are propagated from existing plants will provide population stability and will be implemented as necessary. **Exotic Plant Species:** Non-native plants, some of which are invasive will not be tolerated in Craggy Gardens. Recent survey work has identified problem species and a combination of mechanical and chemical methods will be used to control these species. **Unofficial Trails:** All unofficial trails will be closed and brushed in to reduce trampling and soil erosion.

INTRODUCTION

General Setting

Craggy Gardens, located 20 miles northeast of Asheville, North Carolina, consists of approximately 700 acres which include three peaks over 5,000 feet in elevation--Craggy Knob (to include Craggy Flats), Craggy Dome and Craggy Pinnacle (see figure 1). The Craggy Gardens lie on the northern slope of the Great Craggy Mountains, which connect to the Black Mountains to the north. Elevations on the Parkway range from approximately 5,000 feet at the picnic area to a little more than 6,000 feet on Craggy Pinnacle. The area is located on Craggy Pinnacle and Montreat USGS 7.5 minute topographic quadrangle maps. This high-elevation area provides cool summer temperatures, 360° views of the surrounding mountains, and a spectacular display of catawba rhododendron in bloom each June. Developed facilities include a picnic ground, a visitor contact station, two primary trails, and access to forest service trails. The area is generally closed to traffic during the winter months (mid-November to mid-April) due to snow and freezing temperatures.

Craggy Gardens are underlain by rocks of the Precambrian Great Smoky Group composed of mica gneiss and schist. A variety of crags and ledges have been produced through chemical and physical weathering of the underlying parent material. The slopes are moderately steep with many outcrops forming steep bluffs with broad flat tops. A shallow, rocky soil lies on the slopes, over the bluffs and in the many cracks and crevices in the faces of the bluffs.

Several plant communities occur at Craggy Gardens. The **Northern Hardwood Forests** are common on upper slopes and ridges (McLeod 1988; Schafale and Weakley 1990) and contain canopy dominants such as Northern Red Oak (*Quercus rubra*), Sugar Maple (*Acer saccharum*), Buckeye (*Aesculus flava*), and Beech (*Fagus grandifolia*). Herbaceous strata are typically lush and diverse, closely resembling Rich Cove Forests. Sites where Beech (*Fagus grandifolia*) is the sole dominant and the herbaceous stratum is comprised entirely of Sedge (*Carex pennsylvanica*) are known as **Beech Gap Forests** and occur sporadically on ridges and gaps but with limited overall distribution in the Southern Appalachian region. Forests with high dominance by Northern Red Oak (*Quercus rubra*) are classified as **High Elevation Red Oak Forests** (DeLapp 1978) and occur on drier sites, usually side slopes and ridges. Three “treeless” plant communities occur at Craggy Gardens: **Grassy Balds**, **Heath Balds**, and **High Elevation Rocky Summits**. **Grassy Balds** are distinguished by a lack of and shrubs or trees and a high abundance of grasses [such as mountain oat grass (*Danthonia compressa*) and hairgrass (*Deschampsia flexuosa*)] and forbs [such as Angelica (*Angelica triquinata*) and Goldenrod (*Solidago glomerata*)]. **Grassy Balds** are a rare and unique community found only in the Southern Appalachians. **Heath Balds** are characterized by high dominance of deciduous and evergreen shrubs, and a lack of trees and herbs. At Craggy Gardens purple rhododendron (*Rhododendron catawbiense*), mountain laurel (*Kalmia latifolia*) and high bush blueberry (*Vaccinium corymbosum*) are common shrubs. Lastly, the plant community known as **High Elevation Rocky Summit** contains plants which are rooted in the many cracks and crevices afforded by the habitat. This community is significant because it contains a higher proportion of rare and unique species than any other community at Craggy Gardens.

Purpose of this Document

The purpose of this document is to establish a long-term plan that will address multiple issues relating to vegetation. This plan, once approved, will serve to guide management actions and provide context for management decisions. The following issues are identified and will be discussed in detail below:

- Grassy Bald and Plant Succession
- Rare Plant Species Protection and Management
- Exotic Invasive Plant Species Management
- Unofficial or Social Trail Use

RESOURCE ISSUES

Grassy Balds

Background. The origins of Grassy Balds are controversial (Mark 1958; Mark 1959; Smathers 1982). Some ecologists believe these communities to be naturally occurring (P. Weigl, pers. comm.), while others contend that they are the by-product of early European settlers clearing land for grazing of livestock (Wells 1936; Wells 1956). A

discussion of the various theories that have been debated in the scientific community about the origins and maintenance of grassy balds is beyond the scope of this document. Schafale and Weakley (1990) provide an excellent narrative of this community and identify many key articles. Despite the debate about the naturalness of grassy balds, there are many rare species that are dependent on openings at high elevations, such habitat can be found in grassy balds.

In reference to Grassy Balds, Weakley *et al* (1998) of The Nature Conservancy state that “This community has small range, few occurrences, and is rapidly disappearing due to vegetational succession”. Succession is a natural process whereby species replace each other over time and space, e.g. a grazed field if left abandoned will eventually convert to a forest as various herbs, shrubs, and trees invade. At Craggy Gardens, Grassy Balds and Heath Balds represent early stages of succession, which if left unchecked will result in a forested community. Many of the Grassy Bald areas are currently dominated by Blackberry (*Rubus canadensis*) which is outcompeting the herbaceous flora for light and water and is a precursor to tree invasion.

The uniqueness and rarity of the Grassy Bald plant community cannot be understated. The Nature Conservancy ranks this community as G1 – Critically Imperiled Globally. The Craggy Mountains are considered one of the most unique areas in the entire Southern Appalachian region and is considered a high priority for park natural resources.

Current Situation. The lack of any past or current management in the Grassy Balds of Craggy Gardens has resulted in an extremely critical situation where without restoration efforts this community will be permanently lost. Any further delay in restoration will likely result in irreversible loss of the grassy balds. Once woody shrubs and trees invade this community, the species that are endemic and adapted to Grassy Bald habitat cannot persist at the site and will become locally extinct. Approximately 90% of the Grassy Bald habitat in the Craggy Mountains are in the early stages of succession via blackberry encroachment. Plants, which are adapted to this open, high elevation environment, are declining due to shading from encroaching woody species. Photographs of Craggy Pinnacle in figure 2 and Craggy Flats in figure 3 illustrate the stages of plant succession these sites have undergone.

Rare Plant Species

History of Protective Measures. Several rare plant locations occur in Craggy Gardens. The primary threat to the rare species and sensitive areas of Craggy Gardens is trampling by park visitors. Secondary threats to these valuable resources are exotic invasive plants and encroachment by surrounding vegetation. Other possible but undocumented threats include factors related to air quality (ozone, acid deposition, volatile organic compounds).

In the mid 1980’s the NPS took steps to reduce trampling impacts at Craggy Pinnacle by permanently closing a trail and constructing rock walled overlooks at the summit and west slope. An interpretive sign was installed at the summit overlook describing the fragile habitat. A graduate student (Bart Johnson) examined visitor use and designed the

summit overlook at Craggy Pinnacle, and also started a detailed monitoring design for the rare plants of the site. The U.S. Fish and Wildlife Service subsequently hired contractors (Jamie Donaldson and Alan Smith) to continue monitoring of federally rare plant species.

Current Situation. The old trail that was closed has completely regrown from surrounding vegetation and is not easily detectable. Access to the summit of Craggy Pinnacle is restricted to the trail leading from the Craggy Dome parking lot at milepost 364.1. Trampling has been greatly reduced but not eliminated at the summit. Despite extensive monitoring at the site for rare species, the health and vigor of the plant populations at Craggy Pinnacle is unclear. Whether to augment existing populations is uncertain at this time.

Exotic Invasive Plant Species

Background. Exotic invasive plants can be defined as those which are not native to the flora of the Southern Appalachians and which pose serious threats to ecosystem health and function. NPS policy is to control or eradicate where possible all such invasive exotic species. While a large number of non-native plant species occur in the Blue Ridge Parkway, only a small proportion is invasive. Characteristics that define invasive exotics include shade-tolerance, rapid growth, prolific seed production, and displacement of native species.

Current Situation. Due to limited resources and personnel, a strategy involving prioritization of exotic species was implemented in the park. Highest priority areas for treatment include sites with rare or unusual species, unique or sensitive plant communities, or other significant natural resources. Craggy Gardens is included in the high priority areas. A survey of exotic plants was conducted during the field season of 2000 to determine the distribution and extent of abundance for invasive exotics. In Craggy Gardens, *Spiraea japonica* (Japanese Spiraea) was identified and targeted for treatment. This woody shrub is an escape from old homesites and has gradually made its way northward from milepost 375 where an old homesite known as Rattlesnake Lodge appears to be the primary source of this exotic. Principally occurring along the mowed roadside, this species also occurs secondarily within shaded, undisturbed forests.

Unofficial Trails

Current Official Trail System. The current extent of NPS sanctioned and maintained trails at Craggy Gardens are illustrated in figure 4. The Mountains-To-Sea (MTS) represents the bulk of the trail distance beginning at Bee Tree Gap at milepost 367.6 moving upslope to Craggy Picnic Area which then leads to the CCC shelter at Craggy Flats. The MTS trail then departs from the trail that leads to the visitor center and follows the contour of the slope below and to the west of the visitor center where it skirts around the western and northern flank of Craggy Pinnacle and eventually leading to the parkway motor road where it crosses the parkway and leads to the Graybeard Mountain parking overlook at milepost 363.4. Other trails include a spur leading from the CCC

shelter on Craggy Flats to an overlook; the trail leading from the Craggy Dome parking overlook to the summit of Craggy Pinnacle.

Current Situation. There are currently 2 unofficial routes that are actively being used. The first leads from the Craggy Picnic Area and heads north as an apparent short cut route to the MTS trail. The second leads from the Graybeard Mtn overlook and heads south to the summit of Craggy Dome. Along both of these routes soil erosion and vegetation trampling is occurring.

GOALS/OBJECTIVES AND IMPLEMENTATION

Any planned activity should have goals and objectives that serve to maintain focus on the project. This management plan addresses four separate, but related issues. The desired result for each issue is presented below. In addition, this plan provides guidance on a method of implementation that will meet the goals and objectives.

Grassy Bald

Goal. A complete restoration and maintenance of the grassy bald plant community at Craggy Gardens is the primary goal. Aerial photography acquired in 1979 will be used as the best known, quantifiable source of information from which to base restoration efforts. The location and size of patches of grassy bald habitat can be observed from this aerial photography. Analysis via a Geographic Information System (GIS) revealed 12 acres of Grassy Bald habitat that will be targeted for restoration (see figure 5). The objective is to convert habitat that is currently dominated by woody shrubs and trees to a plant community dominated by herbaceous forbs and grasses. Additional work with tree ring analysis may indicate that the grassy bald(s) were even larger than that derived from the 1979 imagery. Limitations in funding and staffing will eventually determine the amount of grassy bald that can be restored.

Implementation. The methods required to restore and maintain grassy balds are well known and widely accepted in the Southern Appalachian region (Saunders, Ramseur et al. 1981). Implementation of these methods will result in the restoration of this rare plant community. There is a high probability of success for restoring these grassy balds because: (1) restoration methods are simple and have been evaluated by other land managers, (2) existing park staff are knowledgeable about the maintenance of Grassy Balds, but simply lack the necessary equipment to complete the task, and (3) hiring of a biological technician will provide additional assistance to implement the restoration program. Once the initial restoration is started and equipment acquired, the task of routine maintenance of this community is well within the capacity of the existing staff.

A two-phase plan will be implemented to restore the Grassy Bald plant community on Craggy Flats, Craggy Pinnacle, and at the Bullhead Mtn/Locust Knob sites. The first “clearing” phase will consist of the removal of woody plants by mechanical cutting. Blackberry canes will be mowed with either a walk behind brush mower or weedeater

equipped with a metal blade, depending on terrain. Woody shrubs, such as blueberry and rhododendron will be cut with either hand tools (loppers, saws) or power equipment (chainsaws) depending on size. Small trees (< 20-cm dbh) will be cut with chainsaws. Plant material will be reduced into smaller sized pieces and hand carried and scattered in nearby forests. If excessive amounts of material are accumulated they will be removed off-site, where feasible. The second “maintain” phase consists of mowing the site twice in one summer, on a 3-year interval. At Great Smoky Mountains National Park the optimal method for maintaining grassy balds free of woody vegetation involve mechanical mowing (weed eaters and walk behind sickle bar mower) during June and August (Kristine Johnson, pers comm.).

Prior to restoration efforts a limited number of permanent plots will be installed to document and monitor changes in vascular plant species. Quantitative data will be collected on the grassy bald floral diversity and abundance in each plot and photographs will document qualitative effects.

Rare Species

Goals. The goals for managing rare plants at Craggy Gardens are consistent with the goals indicated in the parks *Rare Plants Management Plan 1994*, which are: (1) to provide optimum habitat conditions for natural regeneration, and (2) to maintain and enhance existing populations by altering management practices as necessary to protect and accommodate rare species.

Implementation. Data that are reliable, accurate, and consistent are needed to meet the above stated goals. Therefore, a long-term monitoring system will be implemented. Each individual or clump of individuals will be accurately mapped using an Electronic Distance Measuring (EDM) device. The mapping will be done such that entities can be relocated in the future, thus allowing tracking of individuals over time and space. Parameters such as plant size, flowering, and fruit set will be recorded. In addition, an assessment of the condition of adjacent and potentially encroaching vegetation will be made. Photographs will be used to document qualitative changes. Ideally, both federal and state listed rare plants will be included in this monitoring effort, but limited resources may require that G1 and G2 ranked species receive higher priority. Any direct impact observed, such as trampling, will be immediately addressed. Analysis of monitoring data will indicate population health; if a population decrease over 20% in plant density is detected then management action will be required. Details on the monitoring for each species can be found in the *Rare Plants Management Plan (1994)* as amended.

Exotic Invasive Species

Goal. The main goal for this issue is to reduce the threat posed by exotic invasive species by either total eradication where feasible, or adopt a containment strategy. Total eradication is possible with small to medium sized patches and will likely require repeat visits. Large patches will require larger expenditures of resources, which if limited may

necessitate a containment strategy where the species is treated when it occurs outside a predetermined zone.

Implementation. As previously indicated in this plan, Japanese Spirea (*Spiraea japonica*) is the principal exotic that threatens Craggy Gardens. Complete removal of this species would be ideal; however, its abundance increases south of Craggy Gardens in the park. Therefore, the strategy shall be to eradicate this species as far south as resources will allow. Methods for control are hand cutting and hand pulling for small patches and where soil disturbance will not pose any negative impacts (i.e., pulling on rock outcrops with thin soil should be avoided). Larger patches, such as on roadbanks and in vista clearings, may best be treated with a low concentration (2% active ingredient) of herbicide applied to foliage, or a high concentration (50% active ingredient) applied to cut stumps to prevent regrowth. There is not a species-specific herbicide for Japanese spirea; therefore, broad-spectrum herbicides such as Glyphosate or Triclopyr will be used. Consult with the *Exotic Species Management Plan 1994* for specific details on treatment options and methods of application.

Unofficial Trails

Goal. Two unofficial trails will be closed and any damaged vegetation or soil erosion shall be restored to blend in with surrounding environments.

Implementation. The routes leading to Craggy Dome from the Graybeard Mountain overlook and the shortcut trails along the Mountains-to-Sea Trail near the picnic area will be closed. Karsonite® signs will be used to indicate that the area is closed. The closed area will be brushed in using existing debris (downed limbs) from adjacent forests. Any erosion that is occurring in the closed area will be reduced by installing temporary waterbars. Ideally adjacent vegetation will recolonize the former route without aid; however, it may be necessary to transplant small shrubs from adjacent areas to expedite this process.

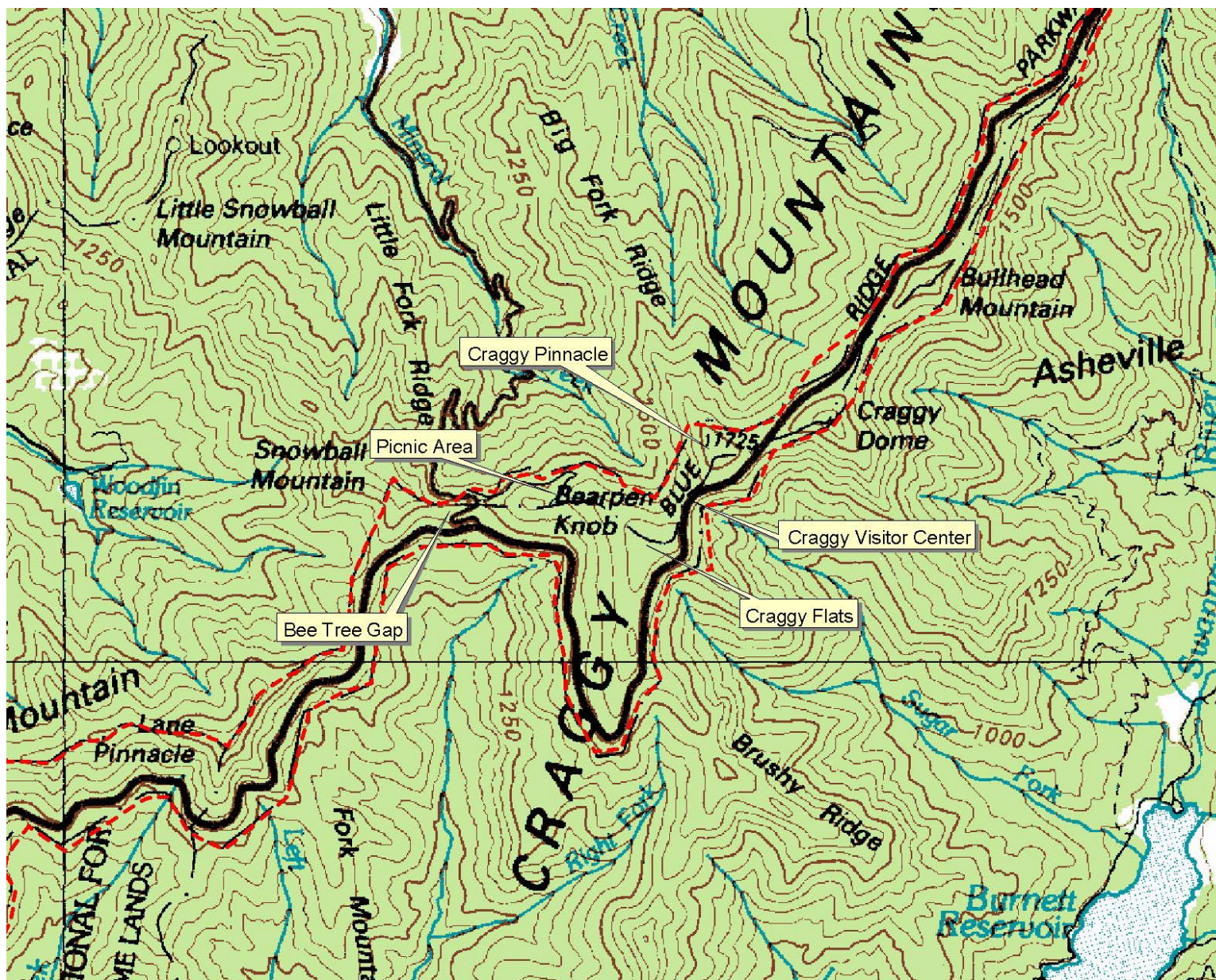


Figure 1. Site map of Craggy Gardens.

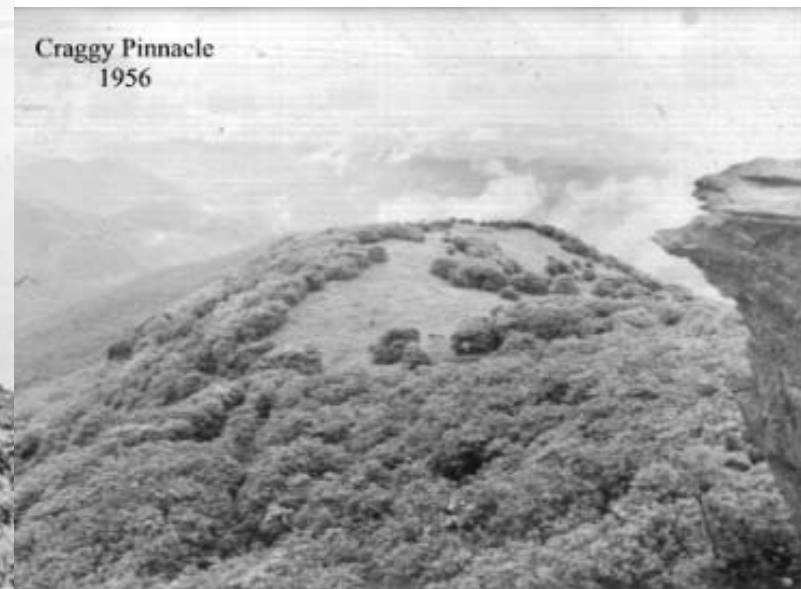
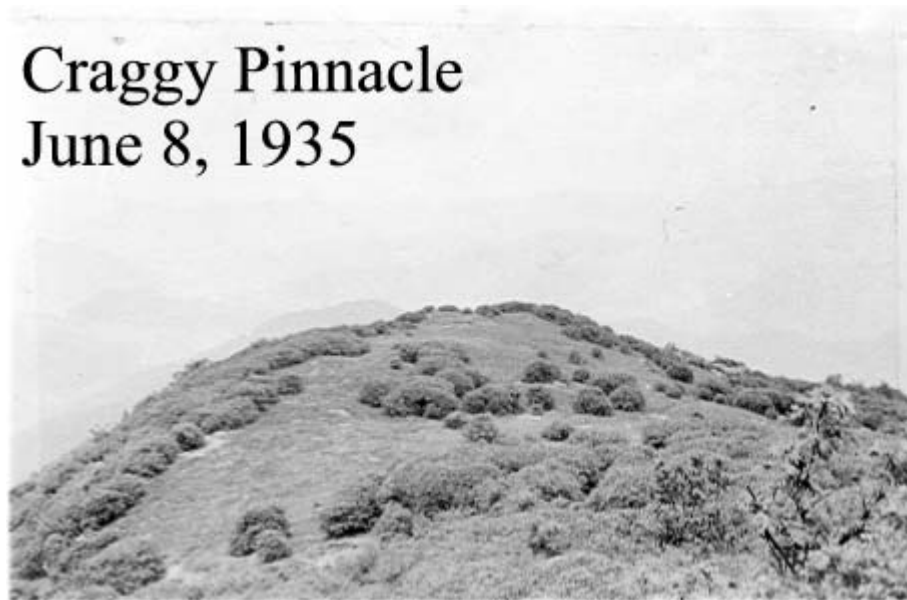


Figure 2. Plant succession at Craggy Pinnacle from 1935 – 2001.



Figure 3. Plant succession at Craggy Flats from 1956 – 2001.

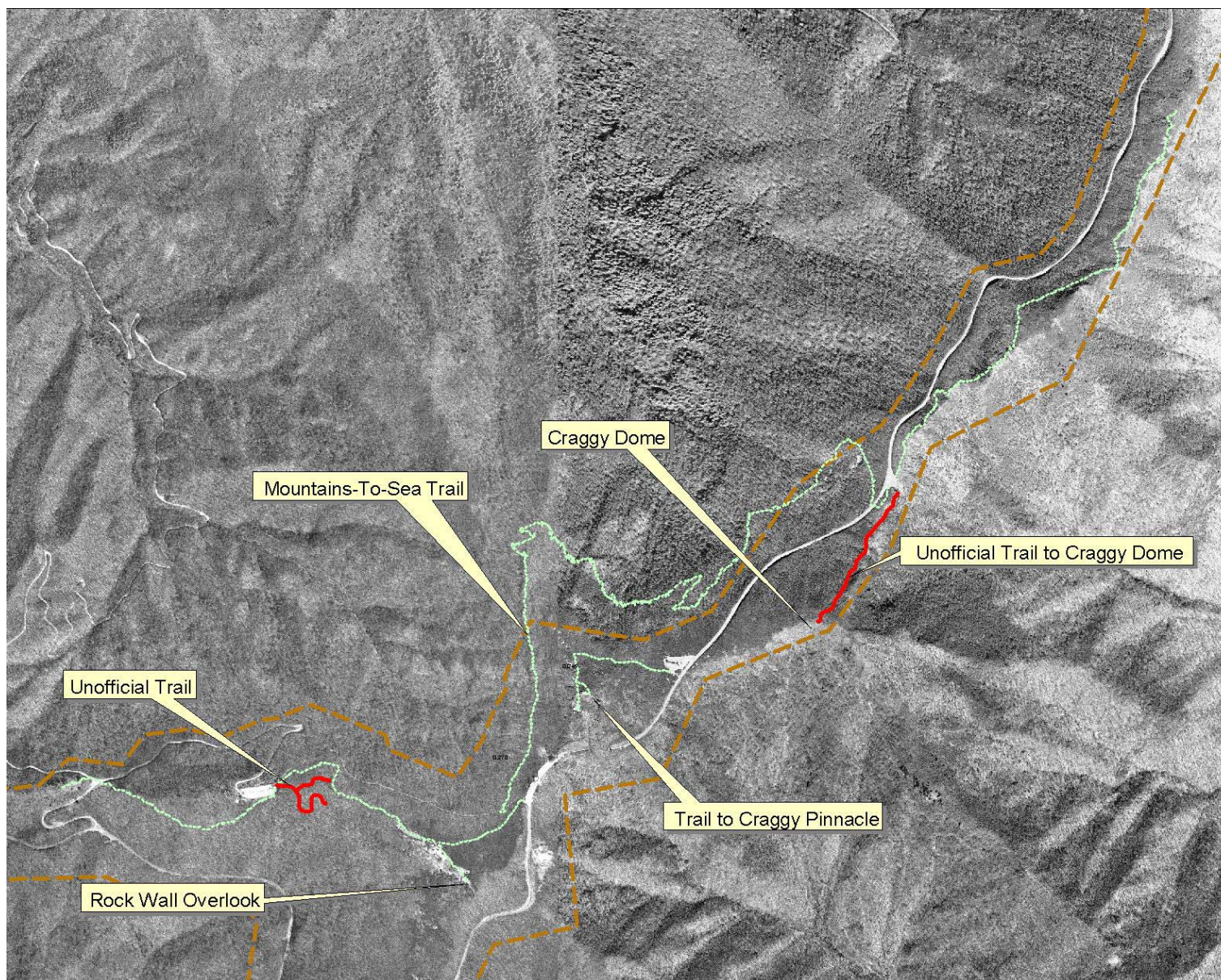


Figure 4. Location of NPS approved trails at Craggy Gardens.

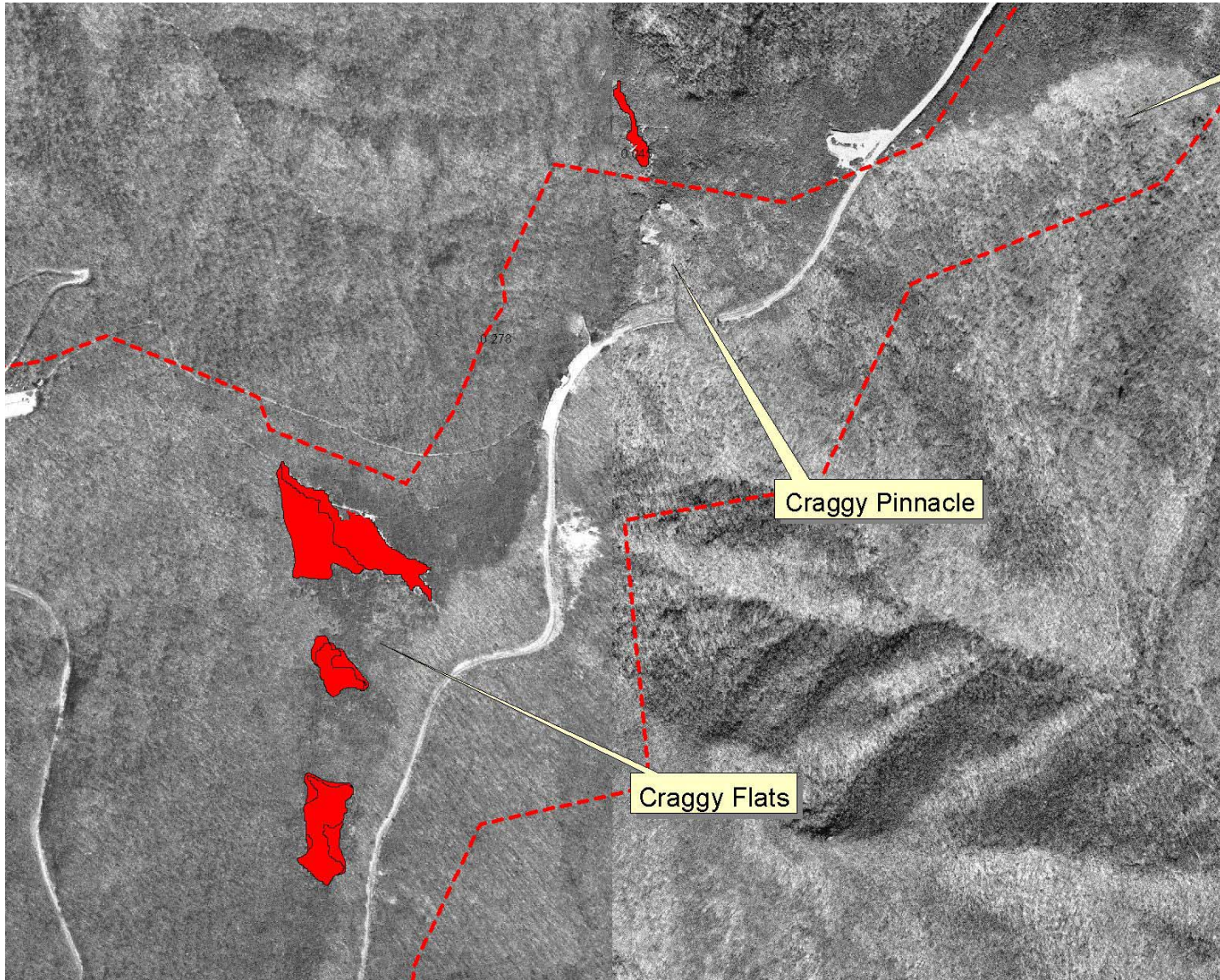


Figure 5. Grassy Bald habitat targeted for restoration.

Literature Cited

- DeLapp, J. A. (1978). Gradient analysis and classification of the high elevation red oak community of the southern Appalachians, Department of Botany, North Carolina State University, Raleigh, N.C. 140 p.
- Mark, A. F. (1958). The ecology of the southern Appalachian grass balds. *Ecol. Mongr.* 28: 293-336.
- Mark, A. F. (1959). The flora of the grass balds and fields of the southern Appalachian mountains. *Castanea* 24: 1-21.
- McLeod, D. E. (1988). Vegetation patterns, floristics and environmental relationships in the Black and Craggy Mountains of North Carolina., The University of North Carolina at Chapel Hill, Chapel Hill, NC.
- Saunders, P. L., G. S. Ramseur, et al. (1981). An ecological investigation of a Spruce-Fir burn in the Plott Balsam mountains, North Carolina., Department of the Interior, National Park Service.
- Schafale, M. P. and A. S. Weakley (1990). Classification of the natural communities of North Carolina: third approximation. North Carolina Department of Environment, Health and Natural Resources, Division of State Parks and Recreation, Natural Heritage Program, Raleigh, North Carolina, USA.
- Smathers, G. A. (1982). Man as a factor in Southern Appalachian bald formation and illustrations of selected sites along the Blue Ridge Parkway in North Carolina, U.S. Department of the Interior, National Park Service, Research/Resources Management Report: 39 pp.
- Weakley, A. S., K. D. Patterson, et al. (1998). International Classification of Ecological Communities: Terrestrial Vegetation of the southeastern United States. Working draft of March 1998, The Nature Conservancy, Southeast Regional Office, Southern Conservation Science Department, Community Ecology Group, Chapel Hill, NC.
- Wells, B. W. (1936). Origin of the Southern Appalachian grass balds. *Science* 83:283.
- Wells, B. W. (1956). Origin of Southern Appalachian grass balds. *Ecology* 37:592.